

CLAIMS

What is claimed is:

- 5 1. A data storage system for accessing a set of data, comprising:
- a data access manager for establishing a plurality of tokens for accessing
 the set of data;
- a network connection in communication with the data access manager; and
- a data storage assembly in communication with the network connection,
- 10 the data storage assembly comprising (i) a set of storage locations that stores the
 set of data, and (ii) a control circuit configured to:
- receive from a host in communication with the data access
 manager over the network connection (i) a request to access the set of data
 and (ii) a first access token of the plurality of tokens that provides access
- 15 to the set of data stored in the set of storage locations in the data storage
 system;
- generate an authorization signal that controls access to the set of
 data based on the first access token and a second access token of the
 plurality of tokens, the second access token associated with the set of
- 20 storage locations; and
- produce a response signal that provides a response to the request
 over the network connection to the host based on the authorization signal.

2. The data storage system of claim 1, wherein the control circuit is configured to:
perform a comparison of the first access token to the second access token
associated with the set of storage locations; and

5 if the comparison indicates that the first access token and the
second access token are identical, produce an access approval signal that
provides access to the set of storage locations; and
if the comparison indicates that the first access token and the
second access token are not identical, produce an access failure signal that
indicates a denial of access to the set of storage locations.

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3. The data storage system of claim 1, wherein the data access manager comprises a
processor and a memory that stores a data access manager application, wherein
the processor operates in accordance with instructions of the data access manager
application stored in the memory to establish the plurality of tokens for accessing
15 the set of data, and wherein the instructions of the data access manager application
configure the processor to:

associate, prior to receiving the first access token, the second access token
with the set of storage locations in response to an initial request from the host to
store the set of data;

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allocate the set of storage locations in the data storage assembly to receive
the set of data in response to the request to store the set of data, while tagging
each storage location with the second access token; and

provide to the host the set of storage locations and the first access token
based on the second access token.

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4. The data storage system of claim 3, wherein the data access manager application comprises further instructions that configure the processor to:

generate, prior to associating the second access token with the set of storage locations, an initial access token of the plurality of tokens in response to the initial request to store the set of data in the data storage system;

provide a first copy of the initial access token as the first access token to the host over the network connection; and

provide a second copy of the initial access token as the second access token to the data storage assembly.

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5. The data storage system of claim 1, wherein the request is one of a read request to read data from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.

- 15 6. The data storage system of claim 1, wherein the network connection is a local area network such that the data storage system forms a storage area network.

7. In a data storage system having a set of storage locations, a method for accessing a set of data stored in the set of storage locations, comprising the steps of:

20 receiving from a host (i) a request to access the set of data stored in the set of storage locations and (ii) a first access token that provides access to the set of data stored in the set of storage locations;

generating an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations; and

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producing a response signal that provides a response to the request to the host based on the authorization signal.

8. The method of claim 7, wherein the step of generating an authorization signal comprises:
- comparing the first access token to the second access token associated with the set of storage locations; and
- 5 if the comparing step indicates that the first access token and the second access token are identical, producing an access approval signal that provides access to the set of storage locations; and
- if the comparing step indicates that the first access token and the second access token are not identical, producing an access failure signal
- 10 that indicates a denial of access to the set of storage locations.
9. The method of claim 7, further comprising the steps of:
- prior to the step of receiving the first access token, associating the second access token with the set of storage locations in response to an initial request from
- 15 the host to store the set of data;
- allocating the set of storage locations in the data storage assembly to receive the set of data in response to the initial request to store the set of data, while tagging each storage location with the second access token; and
- providing to the host the set of storage locations and the first access token
- 20 based on the second access token.

10. The method of claim 9, further comprising the steps of:
- prior to the step of associating the second access token with the set of storage locations, generating an initial access token in response to the initial request to store the set of data in the data storage system; and
- 5 providing a first copy of the initial access token as the first access token to the host that initiates the request; and
- providing a second copy of the initial access token as the second access token.
- 10 11. The method of claim 7, wherein the step of receiving the first access token and the request comprises receiving one of a read request to read data from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.
- 15 12. The method of claim 7, wherein the data storage system is a storage area network comprising a data access manager and at least one data storage assembly comprising storage devices.

13. A computer program product that includes a computer readable medium having instructions stored thereon for accessing a set of data, such that the instructions, when carried out by a data storage system having a set of storage locations storing the set of data, cause the data storage system to perform the steps of:
- 5 receiving from a host (i) a request to access the set of data stored in the set of storage locations and (ii) a first access token that provides access to the set of data stored in the set of storage locations;
- generating an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations; and
- 10 produce a response signal that provides a response to the request to the host based on the authorization signal.
14. A data storage assembly for accessing a set of data, comprising:
- 15 a set of storage locations that stores the set of data; and
- a control circuit in communication with the set of storage locations, the control circuit configured to:
- receive from a host in communication with the control circuit over a network connection (i) a request to access the set of data and (ii) a first access token that provides access to the set of data stored in the set of storage locations;
- 20 generate an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations; and
- 25 produce a response signal that provides a response to the request over the network connection to the host based on the authorization signal.

15. The data storage assembly of claim 14, wherein the control circuit is configured to:
- perform a comparison of the first access token to the second access token associated with the set of storage locations; and
 - 5 if the comparison indicates that the first access token and the second access token are identical, produce an access approval signal that provides access to the set of storage locations; and
 - if the comparison indicates that the first access token and the second access token are not identical, produce an access failure signal that
 - 10 indicates a denial of access to the set of storage locations.
16. The data storage assembly of claim 14, wherein the request is one of a read request to read data from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.
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17. In a data storage assembly having a set of storage locations, a method for accessing a set of data stored in the set of storage locations, comprising the steps of:
- receiving from a host (i) a request to access the set of data stored in the set
 - 20 of storage locations and (ii) a first access token that provides access to the set of data stored in the set of storage locations;
 - generating an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations; and
 - 25 producing a response signal that provides a response to the request to the host based on the authorization signal.

18. The method of claim 17, wherein the step of generating an authorization signal comprises:

comparing the first access token to the second access token associated with the set of storage locations; and

- 5 if the comparing step indicates that the first access token and the second access token are identical, producing an access approval signal that provides access to the set of storage locations; and

- 10 if the comparing step indicates that the first access token and the second access token are not identical, producing an access failure signal that indicates a denial of access to the set of storage locations.

19. The method of claim 17, wherein the step of receiving the first access token and the request comprises receiving one of a read request to read data from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.
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20. A computer program product that includes a computer readable medium having instructions stored thereon for accessing a set of data, such that the instructions, when carried out by a data storage assembly having a set of storage locations that store the set of data, cause the data storage assembly to perform the steps of:
- 5 receiving from a host (i) a request to access the set of data stored in the set of storage locations and (ii) a first access token that provides access to the set of data stored in the set of storage locations;
- generating an authorization signal that controls access to the set of data based on the first access token and a second access token associated with the set of storage locations; and
- 10 producing a response signal that provides a response to the request to the host based on the authorization signal.

21. A host for requesting access to a set of data stored in a set of storage locations in a data storage system, comprising:
- a memory comprising a host application;
 - an input/output controller; and
 - 5 a processor in communication with the memory and the input/output controller, wherein the processor operates in accordance with instructions of the host application stored in the memory to request access to the set of data, and the instructions of the host application configure the processor to:
 - 10 generate a request to access the set of data stored in the set of storage locations;
 - provide through the input/output controller to the data storage system the request to access the set of data and a first access token that provides access to the set of data; and
 - 15 obtain through the input/output controller from the data storage system a response signal that provides a response to the request based on the first access token and a second access token associated with each storage location.
22. The host of claim 21, wherein the request is one of a read request to read data
20 from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.

23. In a host, a method for requesting access to a set of data stored in a set of storage locations in a data storage system, comprising the steps of:
- generating a request to access the set of data stored in the set of storage locations;
 - 5 providing the request to access the set of data and a first access token that provides access to the set of storage locations; and
 - obtaining a response signal that provides a response to the request based on the first access token and a second access token associated with each storage location.
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24. The method of claim 23, wherein the step of providing the first access token and the request comprises providing one of a read request to read data from at least one of the set of storage locations and a write request to write data to at least one of the set of storage locations.
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25. A computer program product that includes a computer readable medium having instructions stored thereon for requesting access to a set of data stored in a set of storage locations in a data storage system, such that the instructions, when carried out by a computer, cause the computer to perform the steps of:
- 20 generating a request to access the set of data stored in the set of storage locations;
 - providing the request to access the set of data and a first access token that provides access to the set of storage locations; and
 - obtaining a response signal that provides a response to the request based
- 25 on the first access token and a second access token associated with each storage location.

26. A data access system for providing access to a set of data, comprising:
- a host comprising (i) a memory having a host application, (ii) an input/output controller, and (iii) a processor in communication with the memory and the input/output controller, wherein the processor operates in accordance with instructions of the host application stored in the memory to request access to the set of data;
 - a network connection in communication with the host; and
 - a data storage assembly in communication with the network connection, the data storage assembly comprising (i) a set of storage locations that stores the set of data, and (ii) a control circuit, wherein:
 - the processor of the host operates in accordance with the host application to provide to the data storage assembly through the input/output controller of the host and the network connection (i) a request to access the set of data and (ii) a first access token of a plurality of tokens that provides access to the set of data stored in the set of storage locations in the data storage assembly;
 - the control circuit of the data storage assembly is configured to receive over the network connection (i) the request to access the set of data and (ii) the first access token provided by the host;
 - the control circuit is configured to generate, in response to receiving the request and the first access token, an authorization signal that controls access to the set of data based on the first access token and a second access token of the plurality of tokens, the second access token associated with the set of storage locations; and
 - the control circuit is configured to produce a response signal that provides a response to the request over the network connection to the host based on the authorization signal.

27. The data access system of claim 1, further comprising a data access manager in communication with the network connection, the data access manager comprising a processor and a memory that stores a data access manager application, wherein the processor operates in accordance with instructions of the data access manager application stored in the memory to establish the plurality of tokens for accessing the set of data, and wherein the instructions of the data access manager application configure the processor to:
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- associate, prior to receiving the first access token, the second access token with the set of storage locations in response to an initial request from the host to store the set of data;
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- allocate the set of storage locations in the data storage assembly to receive the set of data in response to the initial request to store the set of data, while tagging each storage location with the second access token; and
- provide to the host the set of storage locations and the first access token based on the second access token.
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28. In a data access system having a host and a data storage assembly having a set of storage locations, a method for providing access to a set of data stored in the set of storage locations, comprising the steps of:
- providing to the data storage assembly from the host (i) a request to access
5 the set of data and (ii) a first access token of a plurality of tokens that provides access to the set of data stored in the set of storage locations in the data storage assembly;
- generating, in response to receiving the request and the first access token,
an authorization signal that controls access to the set of data based on the first
10 access token and a second access token of the plurality of tokens, the second access token associated with the set of storage locations; and
- producing a response signal that provides a response to the request from
the data storage assembly to the host based on the authorization signal.
- 15 29. The method of claim 1, wherein the data access system further comprises a data access manager, and the method further comprises the steps of:
- associating, prior to receiving the first access token, the second access
token with the set of storage locations in response to an initial request from the
host to the data access manager to store the set of data;
- 20 allocating the set of storage locations in the data storage assembly to receive the set of data in response to the initial request to store the set of data, while tagging each storage location with the second access token; and
- providing to the host from the data access manager the set of storage
locations and the first access token based on the second access token.